

SEQUENCE LISTING

<110> James E. Galen  
University of Maryland

<120> USE OF CLY A HEMOLYSIN FOR EXCRETION OF  
PROTEINS

<130> UOFMD.007A

<150> 60/252,516  
<151> 2000-11-22

<160> 19

<170> FastSEQ for Windows Version 4.0

<210> 1  
<211> 6271  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> pSEC84 Expression Plasmid

<400> 1  
gaattctgtg ttagcacaga ataatgaaaa gtgtgtaaag aaggtaaaaa aaaaccgaat 60  
gcgaggcatc cggttggaaat agggtaaac agacattcg aatgaatga cggtaataaa 120  
taaagttaat gatgatagcg ggagttattc tagttgcag tgaaggttt gtttgacat 180  
tcagtgcgtt caaataactta agaataagtt attgatttta accttgaatt attattgcctt 240  
gatgttaggt gcttatttcg ccattccgca ataatcttaa aaagttccct tgcatttaca 300  
ttttgaaaca tctatagcga taaatgaaac atcttaaaag ttttagtac atattcgtgt 360  
tggattattc tgcatttttg gggagaatgg acttgccgac tgattaatga gggtaatca 420  
gtatgcagtgcataaaaaaa gcaaataaaag gcatataaca gatcgatctt aaacatccac 480  
aggaggatgg gatccaaaat aaggaggaaa aaaaaatgac tagtattttt gcagaacaaa 540  
ctgttagaggt agttaaaagc gcgatcgaaa ccgcagatgg gcatttagat ctttataaca 600  
aatacctcga ccaggtcattc cccttggaaaga cctttgatga aaccataaaa gagttaaGCC 660  
gttttaaaca ggagtactcg caggaagctt ctgttttagt tggtgatatt aaagtttgc 720  
ttatggacag ccaggacaag tattttgaag cgacacaac ttttatgaa tggtgtggc 780  
tcgtgacgca attactctca gcgtatattt tactatttga tgaatataat gagaaaaaaag 840  
catcagcccc gaaagacatt ctcatcatttga tattatgatga tggtgcaag aaactgaatg 900  
aagcgcaaaaa atctctcctg acaagttcac aaagttcaa caacgccttc ggaaaactgc 960  
tggcattaga tagccagtttta actaatgatt tttcgaaaaa aagtagttt ttccagtcac 1020  
aggtggatag aattcgtaag gaagctttagt ccgtgcgtgc agccggcata gtcgcggc 1080  
cgtttggatt aattatttcc tattctatttgc tgcggcgt gattgaaggaa aatttgcattt 1140  
cagaattgaa taacaggcta aaaacagtgc aaaattctt tactagctt tcagctacag 1200  
tgaaaacaagc gaataaagat atcgatgcgg caaaattgaa attagccact gaaatagcag 1260  
caattgggaa gataaaaaacg gaaaccgaaa caaccagatt ctacgttgc tatgtatgatt 1320  
taatgctttc tttattaaaaa ggagctgcaaa agaaaaatgat taacacctgt aatgaatacc 1380  
aacaacgtca tggtaagaag acgctttcg aggttccctga cgtgcgtgc tgataaccta 1440  
ggcccgcaaa aaggccagga accgtaaaaa ggccgcgttg ctggcggttt tccataggct 1500  
ccggccccc gacgagcatc acaaaaaatcg acgctcaagt cagaggtggc gaaaccgac 1560  
aggactataa agataccagg cttttcccccc tggaaagctcc ctcgtgcgtc ctcctgttcc 1620  
gaccctgccc cttaccggat acctgtccgc ctttctccct tcgggaagcg tggcgcttc 1680

tcatagctca cgctgttaggt atctcagttc ggtgttaggtc gttcgctcca agctgggctg 1740  
tgtgcaccaa ccccccgttc agccccaccg ctgcgcctta tccggtaaact atcgtcttga 1800  
gtccaacccg gtaagacacg acttatcgcc actggcagca gccactggta acaggattag 1860  
cagagcgagg tatgttaggcg gtgtacaga gttcttgaag tggtggccta actacggcta 1920  
caactagaagg acagtatttg gtatctgcgc tctgctgaag ccagttaccc tcggaaaaag 1980  
agttggtagc tcttgatccg gcaaacaac caccgctggt agcggtggtt tttttgtttg 2040  
caagcagcag attacgcgc gaaaaaaaaagg atctcaagaa gatccttga tctttctac 2100  
ggggctgac gctcagtaga tctaaaacac taggccaag agtttgtaga aacgaaaaaa 2160  
ggccatccgt caggatggcc ttctgcttaa tttgatgcct ggcagtttat ggcgggcgtc 2220  
ctgcccggcca ccctccggc cggtgcttcg caacgttcaa atccgctccc ggcggatttg 2280  
tcctactcag gagagcggtc accgacaac aacagataaa acggaaaggcc cagtcttcg 2340  
actgagcctt tcgttttatt tgatgcctgg cagttcccta ctctcgcatg gggagacccc 2400  
acactaccat cggcgctacg gcgtttact tctgagttcg gcatggggtc aggtgggacc 2460  
accgcgtac tgccgcagg caaattctgt tttatcagac cgcttctgcg ttctgattta 2520  
atctgtatca ggctgaaaat cttctctcat ccgccaaaac agccaagctg gatctggcaa 2580  
atcgctgaat attccctttt tctccgacca tcaggcacct gagtcgctgt cttttcgtg 2640  
acattcagtt cgctgcgtc acggctctgg cagtgaatgg ggtaaatgg cactacaggc 2700  
gcctttatg gattcatgca aggaaactac ccataataca agaaaaagccc gtcacggct 2760  
tctcaggcg ttttatggcg ggtctgctat gtggtgctat ctgactttt gctgttcagc 2820  
agttcctgcc ctctgatttt ccagtctgac cacttcggat tatcccgtga caggtcattc 2880  
agactggcta atgcacccag taaggcagcg gtatcatcaa caggcttacc cgtcttactg 2940  
tcaaccggat ctaaaacact agcccaaccc ttcatagaag gcccgggtgg aatcgaaatc 3000  
tcgtgatggc aggttggcg tcgcttggc ggtcatttcg aaccccagag tcccgtcag 3060  
aagaactcgt caagaaggcg atagaaggcg atgcgtcgca aatcgggagc ggcgataccg 3120  
taaagcacga ggaagcggtc agccattcg ccgc当地 aatccatgcaat atcacggta 3180  
gccaacgcta tgc当地 ggc当地 acacccagcc ggccacagtc gatgaatcca 3240  
aaaaagcgcc catttccac catgatattc ggcaaggcagg catcgccatg ggtcacgacg 3300  
agatcctcgc cgtc当地 ggc当地 acgcttgc当地 acagttggc tggc当地 3360  
ccctgatgct ct当地 cagatccatg atcatccatg tcgacaagac cggcttccat cggagatcgt 3420  
gctcgctcgat tgc当地 tgc当地 aggttagccgg atcaagcgta 3480  
tgc当地 gcattgc当地 agccatgatg gatacttct cggcaggagc aaggtgagat 3540  
gacaggagat cctgccccgg cacttc当地 aatagcagcc agtcccttc cgc当地 3600  
acaacgtcga gc当地 gcaaggaaacg cccgtc当地 ccagccacga tagccgc当地 3660  
gc当地 gctc当地 cgc当地 caggccacccg gacaggc当地 tcttgc当地 aagaaccggg 3720  
cgccc当地 cgc当地 ctgacagccg gaacacggcg gcatc当地 agccgattgt ct当地 3780  
cagtc当地 cgaatagccct ct当地 cccacccaa gccc当地 aacctgc当地 caatccatct 3840  
tgttcaatca tgc当地 aacga tc当地 ctc当地 gtctcttgc当地 cagatccatg tccc当地 3900  
catc当地 agtcc tggc当地 gaaagccatc cagttactt tgc当地 agggctt cccaaaccc 3960  
ccagaggccg ccccaactgg caattccggt tc当地 gctc当地 acaacatcag caaggagaaa 4020  
ggggcttaccg gcaaccaggc agcccttta taaaggcgct tc当地 tagtgc当地 gaccaggcatc 4080  
agtc当地 gaaa agggccct gccc当地 ccaggttgc当地 attaccggta ttc当地 taagcc 4140  
atgaaaggccg ccacccctt gt当地 ccgtc当地 ctgtaacgaa tctc当地 gc当地 cgatcc 4200  
gtc当地 agataatca cagtc当地 gaga cacacgatca acacacacca gacaaggaa 4260  
cttc当地 gtggta gtttcatggc ct当地 ttcttc当地 ttgc当地 cccaaacccaa ggctatcc 4320  
atgtggacta gacataggga tgc当地 ctggta tggtaatga aaattaactt actacggggc 4380  
tatccctt ctgccc当地 acacggcaac aaaccaccc cactgc当地 ggc当地 4440  
ctcaagcgcc gggccacatca tagcccatat acctgc当地 tgaccacact cacttccct 4500  
aaaaataatc cgctc当地 tca gaccgttccac gggaaatccg tggatgtt gccc当地 catc 4560  
gctcgctccc ggagtttgc当地 tc当地 gagcactt ttgttacccg cccaaacccaa cccaaaccc 4620  
accatc当地 accccatccaa aacacccaaa caagacaaat aatcattgtat tgatgggtga 4680  
aatgggtaa acttc当地 gacaaa cccact taaaacccaa aacatccca aacacacacc 4740  
aaaaaaaacac cataaggagtttataatg ttggtaatca ttgc当地 gacggc当地 ttcaacaaac 4800  
atcaaactac agtggcagga aagc当地 acggca acaattaaac agc当地 acatttccggc 4860  
ttcaacccgagc agtggc当地 agtggc当地 ctcccttgc当地 gataaaaaagg tctttaacta cactactgaaac 4920  
ggc当地 acaggc当地 attcatttgc当地 tccaatc当地 ccggatgctg tagtc当地 cacaac caatccatcgca 4980

tggcaataca ggcacgttaa tgtcgttgca gtgcacacg ccttactgac cagtggctcg 5040  
ccgtaagcg aagtggatat tgtttgcaca cttcctctga cagagtatta cgacagaaat 5100  
aaccaccca atacggaaaa tattgagcgt aagaaagcaa acttccggaa aaaaattaca 5160  
ttaaatggcg gggatacatt cacaataaaa gatgtaaaag tcatgcctga atctataccg 5220  
gcagggtatg aagttctaca agaactggat gagttagatt ctttattaaat tatagatctc 5280  
gggggcacca cattagatat ttctcaggta atggggaaat ttcggggat cagtaaaata 5340  
tacggagact catctttgg tgcctctcg gttacatctg cagtaaaaga tgcccttct 5400  
cttgcgagaa caaaagaag tagctatctt gctgacgata taatcattca cagaaaagat 5460  
aataactatc tgaagcaacg aattaatgtat gagaacaaaa tatcaatagt caccgaagca 5520  
atgaatgaag cacttcgtaa acttgagcaa cgtgtattaa atacgctcaa tgaattttct 5580  
ggttatactc atgttatggt tataggcggt ggcgcagaat taatatgcga tgcagtaaaa 5640  
aaacacacac agattcgtga tgaacgtttt ttcaaaaacca ataactctca atatgattta 5700  
gttaacggta tgcctctcat aggtattaa tgcgtggacaa ggcgcagaacc attgccttca 5760  
aactaaatcc agatgtaaaat caaacagata aaattgtttg tgatacactg gacagtatcc 5820  
cgcaagggga acgaagccgc cttaaccggg ccgcactgac ggcaggctcg gccttataca 5880  
gacaagatcc cccggccccct ttccctttat gtgcgtcgct gacgaaagaa accacatttt 5940  
cagatatcgt gaatatattg agatcgctat ttccaaaaga gatggccgat tttaattctt 6000  
caatagtcac tcaatccctc tcacaacaag agcaaaaaag tgatgaagag accaaaaaaa 6060  
atgcgatgaa gctaataat taattcaatt attatttgat tccctttatc cactatcagg 6120  
ctggataaaag ggaactcaat caagttattt tcttaccagt cattacataa tcgttattat 6180  
gaaataatcg tttgcactgt ctctgttatt caggcaattt caataaaggc acttgctcac 6240  
gctctgtcat ttctgaaac ttctcatgct g 6271

<210> 2  
<211> 305  
<212> PRT  
<213> *Salmonella Typhi*

<400> 2  
Met Thr Ser Ile Phe Ala Glu Gln Thr Val Glu Val Val Lys Ser Ala  
1 5 10 15  
Ile Glu Thr Ala Asp Gly Ala Leu Asp Leu Tyr Asn Lys Tyr Leu Asp  
20 25 30  
Gln Val Ile Pro Trp Lys Thr Phe Asp Glu Thr Ile Lys Glu Leu Ser  
35 40 45  
Arg Phe Lys Gln Glu Tyr Ser Gln Glu Ala Ser Val Leu Val Gly Asp  
50 55 60  
Ile Lys Val Leu Leu Met Asp Ser Gln Asp Lys Tyr Phe Glu Ala Thr  
65 70 75 80  
Gln Thr Val Tyr Glu Trp Cys Gly Val Val Thr Gln Leu Leu Ser Ala  
85 90 95  
Tyr Ile Leu Leu Phe Asp Glu Tyr Asn Glu Lys Lys Ala Ser Ala Gln  
100 105 110  
Lys Asp Ile Leu Ile Arg Ile Leu Asp Asp Gly Val Lys Lys Leu Asn  
115 120 125  
Glu Ala Gln Lys Ser Leu Leu Thr Ser Ser Gln Ser Phe Asn Asn Ala  
130 135 140  
Ser Gly Lys Leu Leu Ala Leu Asp Ser Gln Leu Thr Asn Asp Phe Ser  
145 150 155 160  
Glu Lys Ser Ser Tyr Phe Gln Ser Gln Val Asp Arg Ile Arg Lys Glu  
165 170 175  
Ala Tyr Ala Gly Ala Ala Gly Ile Val Ala Gly Pro Phe Gly Leu  
180 185 190

Ile Ile Ser Tyr Ser Ile Ala Ala Gly Val Ile Glu Gly Lys Leu Ile  
195 200 205  
Pro Glu Leu Asn Asn Arg Leu Lys Thr Val Gln Asn Phe Phe Thr Ser  
210 215 220  
Leu Ser Ala Thr Val Lys Gln Ala Asn Lys Asp Ile Asp Ala Ala Lys  
225 230 235 240  
Leu Lys Leu Ala Thr Glu Ile Ala Ala Ile Gly Glu Ile Lys Thr Glu  
245 250 255  
Thr Glu Thr Thr Arg Phe Tyr Val Asp Tyr Asp Asp Leu Met Leu Ser  
260 265 270  
Leu Leu Lys Gly Ala Ala Lys Lys Met Ile Asn Thr Cys Asn Glu Tyr  
275 280 285  
Gln Gln Arg His Gly Lys Lys Thr Leu Phe Glu Val Pro Asp Val Ala  
290 295 300  
Ser  
305

<210> 3  
<211> 102  
<212> DNA  
<213> Artificial Sequence  
  
<220>  
<223> Cloning primer  
  
<400> 3  
ggatccaaaa taaggagggaa aaaaaaaatga ctagtatttt tgcagaacaa actgttaggg 60  
tagttaaaag cgcgatcgaa acccgagatg gggcattaga tc 102  
  
<210> 4  
<211> 101  
<212> DNA  
<213> Artificial Sequence  
  
<220>  
<223> Cloning primer  
  
<400> 4  
ccttaggttat cagctagcga cgtcaggaac ctgcggaaagc gtcttcttac catgacgttg 60  
tttgttattca ttacagggtgt taatcatttt ctttgcagct c 101  
  
<210> 5  
<211> 97  
<212> DNA  
<213> Artificial Sequence  
  
<220>  
<223> Cloning primer  
  
<400> 5  
cacggtaaga agacgctttt cgaggttcct gacgtcgcta gctgataacc taggtcatgt 60  
tagacagctt atcatcgata agctttaatg cggtagt 97  
  
<210> 6

<211> 69  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 6  
agatctacta gtgtcgacgc tagctatcag gtcgagggtgg cccggctcca tgcaccgcga 60  
cgcaacgcg 69

<210> 7  
<211> 60  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 7  
actagtcacc cagaaacgct ggtgaaagta aaagatgctg aagatcagt gggtgcacga 60

<210> 8  
<211> 101  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 8  
cataaaaagg tatcgatgtat aagctgtcaa acatgagcta gcctaggta ttaccaatgc 60  
ttaatcagtg aggcacctat ctcagcgatc tgtctatttc g 101

<210> 9  
<211> 101  
<212> DNA  
<213> Artificial sequence

<400> 9  
cgaaaatagac agatcgctga gataggtgcc tcactgatta agcattggta atgacctagg 60  
ctagctcatg tttgacagct tatcatcgat aacctttaat g 101

<210> 10  
<211> 71  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 10  
gcgcactagt aaagaaacga accaaaagcc atataaggaa acatacggca tttcccatat 60  
tacacgccccat g 71

<210> 11  
<211> 103  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 11  
taaactaccg cattaaagct tatcgatgt aagctgtcaa acatgacccg ggtcactatt 60  
tgttaactgt taattgtcct tgttcaagga tgctgtctt gac 103

<210> 12  
<211> 46  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 12  
tcatgttga cagcttatca tcgataagct ttaatgcggt agttta 46

<210> 13  
<211> 80  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 13  
gcgcagatct taatcatcca caggaggcgc tagcatgagt aaaggagaag aactttcac 60  
tggagttgtc ccaattcttg 80

<210> 14  
<211> 110  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning primer

<400> 14  
gtgataaact accgcattaa agcttatcga tgataagctg tcaaacatga gcgctctaga 60  
actagttcat tatttgtaga gctcatccat gccatgtgta atcccagcag 110

<210> 15  
<211> 94  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning Primer

<400> 15  
gcgcactagt aaaaaccttg attgttgggt cgacaacgaa gaagacatcg atgttatcct 60  
gaaaaagtct accattctga acttggacat caac 94

<210> 16  
<211> 97  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning Primer

<400> 16  
aactaccgca ttaaagctta tcgatgataa gctgtcaaac atgagctagc ctaggtcatt 60  
agtctttttt ccaacccca tcggtcggaa cgaagta 97

<210> 17  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Cloning Primer

<400> 17  
cgatgcggca aaattgaaat tagccactga 30

<210> 18  
<211> 8908  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> pSEC84sacB vector

<400> 18  
gaattctgtg ttagcacaga ataatgaaaa gtgtgtaaag aagggtaaaa aaaaccgaat 60  
gcgaggcattt cgggttggaaat agggtaaac agacatttcg aatgaatga cggtaataaa 120  
taaagttaat gatgatagcg ggagtttattc tagttgcgag tgaagggtttt gttttgacat 180  
tcagtgctgtt caaataactta agaataagttt attgatTTT accttgaattt attattgctt 240  
gatgttaggt gcttatttcg ccattccgca ataatcttaa aaagttccct tgcatttaca 300  
ttttgaaaca tctatagcga taaatgaaac atcttaaaag ttttagtattc atattcgtt 360  
tggattatttc tgcatttttgc gggagaatgg acttgccgac tgattaaatga gggtaatca 420  
gtatgcagtgcataaaaaaa gcaaataaaag gcatataaca gatcgatctt aaacatccac 480  
aggaggatgg gatccaaaaat aaggaggaaa aaaaaatgac tagtattttt gcagaacaaa 540  
ctgttagaggt agttaaaagc gogatcgaaa ccgcagatgg ggcatttagat cttaataaca 600  
aatacctcga ccaggtcattc cccttggaaaga cctttgtatga aaccataaaaa gagttaaagcc 660  
gttttaaaca ggagtactcg caggaagctt ctgttttagt tggtgatattt aaagttttgc 720  
ttatggacag ccaggacaag tattttgaag cgacacaaac tggttatgaa tggtgtgggt 780  
tcgtgacgca attactctca gcttatattt tactatttgc tgaatataat gagaaaaaaag 840  
catcagccccca gaaagacattt ctcatttagga tattatgtga tggtgtcaag aaactgaatg 900  
aagcgcaaaaa atctctcctg acaagttcac aaagttcaa caacgcttcc ggaaaactgc 960  
tggcattaga tagccagttt actaatgattt ttccggaaaa aagtagttat ttccagtcac 1020  
agggttagat aattcgttgc aagcttgc ccggctgtgc agccggcata gtcggcggc 1080

cgtttggatt aattatttcc tattcttatttgc ctgcggcgt gattgaaggaa aaattgatttc 1140  
cagaattgaa taacaggcta aaaacagtgc aaaatttctt tactagctta tcagctacag 1200  
tgaaaacaagc gaataaaagat atcgatgcgg caaaaattgaa attagccact gaaatagcag 1260  
caattgggaa gataaaaacg gaaaccgaaa caaccagatt ctacgttgc tatgtatgatt 1320  
taatgcttcc ttattaaaaa ggagctgcaa agaaaatgtat taacacctgt aatgaatacc 1380  
aacaacgtca tggtaagaag acgctttcg aggttccgtga cgtcgctagt aaagaaacgaa 1440  
accaaaagcc atataaggaa acatacggca ttcccattat tacacgccc gatatgctgc 1500  
aaatccctga acagcaaaaaa aatgaaaaat atcaagttcc tgaattcgat tcgtccacaa 1560  
ttaaaaatat ctcttctgca aaaggcctgg acgtttggaa cagctggcca ttacaaaacg 1620  
ctgacggcac tgcgcaaac tattcacggct accacatcg tttgcattt gccggagatc 1680  
ctaaaaatgc ggatgacaca tcgatttaca tttcttatca aaaagtcggc gaaacttcta 1740  
ttgacagctg gaaaaacgct ggccgcgtct ttaaagacag cgacaaattt gatgcaaattt 1800  
attctatctt aaaagaccaa acacaagaat ggtcaggttc agccacattt acatctgacg 1860  
gaaaaatccg ttattttac actgatttctt ccgttaaaca ttacggccaa caaactactga 1920  
caactgcaca agttaacgtt tcagcatcag acagcttcc gaaatcaac ggttagagg 1980  
attataaattt aatctttgac ggtgacggaa aaacgtatca aatgtacag cagttcatcg 2040  
atgaaggccaa ctacagctca ggcgacaacc atacgctgag agatcctcac tacgtagaag 2100  
ataaaggcca caaataactta gtatttgaag caaacactgg aactgaagat ggctaccaag 2160  
gcgagaatc ttattttaaac aaagcataact atggcaaaag cacatcattt ttccgtcaag 2220  
aaagtcaaaaa acttctgcaa agcgataaaa aacgcacggc tgagtttagca aacggcgctc 2280  
tcggtatgat tgagctaaac gatgattaca cactgaaaaa agtgcattttt ccgctgattt 2340  
catctaacac agtaacagat gaaatttgc acgcgaacgt cttaaattt aacggcaaat 2400  
ggtacctgtt cactgactcc cgccgatcaa aaatgacgat tgacggcatt acgtctaacc 2460  
atatttacat gcttggttat gtttcttattt cttaactgg cccatatacaag ccgctgaaca 2520  
aaactggcct tggatggatggatctt atcctaaccg tggatccattt acttactcac 2580  
acttcgctgt acctcaagcg aaaggaaaca atgtcgtat tacaagctat atgacaaaca 2640  
gaggattcta cgccgatccaa caatcaacgt ttgcgccttgc ctccctgtt aacatcaag 2700  
gcaagaaaaac atctgttgc aaagacagca tccttgcaca aggacaatta acagtttaca 2760  
aatagtgacc cgggtcatgt ttgacagctt atcatcgata agctttatgc cggtagttt 2820  
tcacagttaa attgcttaacg cagtccggca ccgtgtatga aatctaacaa tgcgtcatc 2880  
gtcatccctcg gcaccgtcac ccgtggatgtt gtaggcataccg gcttggttat gccggactg 2940  
ccggccctct tggatccatcc gacagcatcg ccgttgcacta tggcgctgt 3000  
ctagcgctat atgcgttgc gcaatttcta tggcgccccc ttctcgagactgactgc 3060  
cgcttggcc gccggccatgt ccgtgtcgct tggctacttg gagccactat cgactacg 3120  
atcatggcga ccacaccgtt ccgtggatcc ctctacgcgg gacgcacatgtt ggccggcatc 3180  
accggcgcca caggtgcggc tggcgcccttcc tttatcgcc acatcaccgaa tggggaaat 3240  
cgggctcgcc acttcgggctt catgagcgct tggcgcccttcc tgggtatggt ggcaggcccc 3300  
gtggccgggg gactgttggg ccgttgcac tttcccttgc ggcggcggtt 3360  
ctcaacggcc tcaacccatctt actggctgc ttccatgc agaggatcgca taaggagag 3420  
cgtcgaccga tggcccttgc agccttcaac ccagtccatgt cttccgggtt ggcggggggc 3480  
atgactatcg tggccgcact tatgactgtt ttcttgc tggccatgcagg aggacagggtt 3540  
ccggcagcgc tctgggtcat ttccggcgat gacgccttc gctggcgcc gacgtatgtt 3600  
ggcctgtcgc ttgggttccatgtt ccgttgccttgc ctcaaggcctt cgtactgg 3660  
cccgccacca aacgtttccg cgagaaggacg gccattatcg ccggcatggc ggccgacg 3720  
ctgggctacg ttttgcgttgc gttcgccatgtt ccgttgccttcc cattatgtt 3780  
cttctcgctt ccggatgcgtt ccgttgccttgc gacgccttc gctggcgcc 3840  
gatgacgacc atcaggagaca gtttcaaggaa tggcgccatgtt ccgttgccttgc 3900  
atcaactggac cgctgtatgtt ccgttgccttgc gacgccttc gctggcgcc 3960  
ttggcatggaa ttgttgcgtt ccgttgccttgc tggcgccatgtt ccgttgccttgc 4020  
gcatggagcc gggccaccc gacgtatgtt ccgttgccttgc gacgccttc gctggcgcc 4080  
ccagcaaaaag ggcggatacc gtttccatgtt ccgttgccttgc gacgccttc gctggcgcc 4140  
ccccccctgac gagcatcaca aaaaatcgacg ctcaaggatgtt ccgttgccttgc tggcgccatgtt 4200  
actataaaga taccaggcgatgtt ccgttgccttgc gacgccttc gctggcgcc 4260  
cctggccgtt accggatacc tggcgccatgtt ccgttgccttgc gacgccttc gctggcgcc 4320  
tagctcacgc tggatgttccatgtt ccgttgccttgc gacgccttc gctggcgcc 4380

cccgaaaccc cccgttcagc ccgaccgcgtg cgcccttatcc ggttaactatc gtcttgagtc 4440  
caacccggta agacacgact tatcgccact ggtagcagcc actggtaaca ggatttagcag 4500  
agcgaggatg ttaggcggtg ctacagagtt cttaaacttcc gttacccctcg gaaaaagagt 4560  
tagaaggaca gtatTTggta tctgcgtct gctgaagcca gttacccctcg gaaaaagagt 4620  
tggtagctct tgatccggca aacaaaccac cgctggtagc ggtgggtttt ttgtttgcaa 4680  
gcagcagatt acgcgcagaa aaaaaggatc tcaagaagat ccttgatct ttctacggg 4740  
gtctgacgct cagtagatct aaaacactag gcccaagagt ttgtagaaac gaaaaaaggc 4800  
catccgtcag gatggccttc tgcttaattt gatgcctggc agtttatggc gggcgtcctg 4860  
cccggcaccc tccggccgt tgcttcgaa cgttcaaattc cgctccggc ggatttgccc 4920  
tactcaggag agcgttcacc gacaaacaac agataaaacg aaaggcccag tcttcgact 4980  
gaggccttcg ttttatttga tgccctggcag ttccctactc tcgcatggg agaccccaaca 5040  
ctaccatcg cgctacggcg tttcacttct gagttcggca tggggtcagg tgggaccacc 5100  
gchgctactgc cgccaggcaa attctgtttt atcagaccgc ttctgcgttc tgatttaatc 5160  
tgtatcaggc tgaaaaatctt ctctcatccg ccaaaacagc caagctggat ctggcaaata 5220  
gctgaatatt cctttgtct ccgaccatca ggcacccgtag tcgctgtctt ttctgtgaca 5280  
ttcagttcgc tgcgctcacg gctctggcag tgaatggggg taaatggcac tacaggcggc 5340  
ttttatggat tcatgcaagg aaactaccca taatacaaga aaagccgctc acgggcttct 5400  
cagggcgttt tatggcgggt ctgctatgtg gtgctatctg acttttgct gttcagcagt 5460  
tcctgcctc tgatTTtcca gtctgaccac ttccggattat cccgtacag gtcattcaga 5520  
ctggctaattc caccctggtaa ggcagggta tcatcaacag gtttacccgt cttactgtca 5580  
accggatcta aaacacttagc ccaaccccttc atagaaggcg gcggtggaat cgaaatctcg 5640  
tgatggcagg ttgggcgtcg cttggctgg tatttcgaa cccagagtcc cgctcagaag 5700  
aactcgtcaa gaaggcgata gaaggcgatg cgctgcgaat cgggagcggc gataaccgtaa 5760  
agcacgagga agcggtcagc ccattcggc ccaagcttct cagcaataatc acgggtagcc 5820  
aacgctatgt cctgatagcg gtccgcacca cccagccggc cacagtcgtatc gaatccaga 5880  
aaggccccat ttccaccat gatattcggc aagcaggcat cggccatgggt cacgacgaga 5940  
tcctcgccgt cgggcatgcg cgccttgcgc ctggcgaaca gttcggctgg cgcgagcccc 6000  
tgatgctctt cgccccatc atcctgtatc acaagaccgg ttccatccg agtacgtgct 6060  
cgctcgatgc gatgttgcg ttgggtggc aatggggcagg tagccggatc aagcgtatgc 6120  
agccgcccga ttgcatcagc catgatggat actttctcg caggagcaag gtgagatgac 6180  
aggagatcct gccccggcac ttccggccat agcagccagt ccctccccgc ttcaagtgaca 6240  
acgtcgagca cagctgcgcgca aggaacgccc gtccgtggcaca gccacatag cccgcgtcggc 6300  
tcgtcctgca gttcattcag ggcacccggac aggtcggtct tgacaaaaag aaccgggccc 6360  
ccctgcgtc acagccggaa cacggcggca tcaagcggc cgttgcgtcg ttgtgcccag 6420  
tcatagccga atagcctctc caccctggc acaagaccgg gccggagaac ctgcgtgcaaa tccatcttgt 6480  
tcaatcatgc gaaacgatcc tcatcctgct tcttgatcag atcttgatcc cctgcggccat 6540  
cagatccttgc gcccggcaagaa agccatccag ttactttgc agggcttccc aaccttacca 6600  
gagggcggcc cagctggcaaa ttccgggtcg ctgctagaca acatcagcaa ggagaaagg 6660  
gctaccggcg aaccagcagc cccttataa aggccgttca gtagtcagac cagcatcagt 6720  
cctgaaaaagg cgggcctgca cccgcctcca ggttgcgtact taccggattc gtaagccatg 6780  
aaagccgcca cctccctgtg tccgtctctg taacgaatct cgcacagcga ttttcgtgtc 6840  
agataagtga atatcaacag tgtgagacac acgtcaaca cacaccagac aagggaaactt 6900  
cgtggtagtt tcatggcctt cttctccttgc cgccaaagcgc ggtaagaggc tattctgtatg 6960  
tggactagac atagggatgc ctcgtgggtgg ttaatgaaaaa ttaacttact acggggctat 7020  
cttcttctg ccacacaaca cggcaacaaa ccacccctc acgtcatgaggc agaaagccctc 7080  
aagcgccggg cacatcatag cccatatacc tgcacgctga ccacactcac tttccctgaa 7140  
aataatccgc tcattcagac cgttccacggg aaatccgtgt gattttgccc gcatcacgct 7200  
gcctccggca gtttgcgtcg agcacttttgc ttaccggca aacaaaaccc aaaaacaacc 7260  
cataaccaac ccaataaaac accaaaaacaa gacaaataat cattgattga tgggtgaaat 7320  
ggggtaaact tgacaaacaa acccacttaa aacccaaaac atacccaaac acacacccaaa 7380  
aaaacccat aaggagttt ataaatgtt gatttcattt atgacggttc aacaaacatc 7440  
aaactacagt ggcaggaaag cgacggaaaca attaaacagc acattagccc gaacagcttc 7500  
aaacgcgagt gggcgtctc ttttgggtat aaaaaggtot ttaacttact acgtgaacggc 7560  
gaacagttt catttgcattt aatcagcccg gatgtctgtat tcacaaccaa tattcgatgg 7620  
caatacagcg acgttaatgt cgttgcgtg catcacgcct tactgaccag tgggtctgccc 7680

gtaagcgaag tggatattgt ttgcacactt cctctgacag agtattacga cagaaataac 7740  
 caacccaata cgaaaaat atacattcac aataaaagat gtaaaagtca tgccctgaatc tataccggca 7800  
 aatggcgaaa atacattcac aataaaagat gtaaaagtca tgccctgaatc tataccggca 7860  
 ggttatgaag ttctacaaga actggatgag ttagattctt tattaattat agatctcggt 7920  
 ggcaccacat tagatatttc tcaggtaatg gggaaattat cggggatcag taaaatatac 7980  
 ggagactcat ctcttgggt ctctctgggt acatctgcag taaaagatgc ccttctctt 8040  
 gcgagaacaa aaggaagttag ctatcttgct gacgatataa tcattcacag aaaagataat 8100  
 aactatctga agcaacgaat taatgatgag aacaaaatat caatagtcac cgaagcaatg 8160  
 aatgaagcac ttctgtaact tgagcaacgt gtattaaata cgctcaatga atttctgg 8220  
 tataactcatg ttatggttat aggccgtggc gcagaattaa tatgcgatgc agtaaaaaaa 8280  
 cacacacaga ttctgtatga acgttttttc aaaaccaata actctcaata tgatttagtt 8340  
 aacggtatgt atctcatagg taattaatga tggacaagcg cagaaccatt gccttcaa 8400  
 taaatccaga tggtaaatcaa acagataaaa ttgttgtga tacactggac agtatcccgc 8460  
 aaggggaacg aagccgcctt aacccggccg cactgacggc aggtctggcc ttatacagac 8520  
 aagatccccg gaccctttc ctttatgtg agctgctgac gaaagaaacc acattttcag 8580  
 atatcgtaa tatattgaga tcgctatttc caaaaagagat ggccgatttt aattcttcaa 8640  
 tagtcactca atccctttca caacaagago aaaaaagtga tgaagagagacc aaaaaaaaaatg 8700  
 cgatgaagct aataaattaa ttcaattattt attgaggccc ctttatccac tattcaggctg 8760  
 gataaaggga actcaatcaa gttatccc taccagtcat tacataatcg ttattatgaa 8820  
 ataatcggtt gcactgtctc tggattcag gcaattcaa taaaggcact tgctcacgct 8880  
 ctgtcattttt ctgaaactct tcattgtg 8908

<210> 19  
 <211> 2253  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> ClyA::SacB fusion gene

<400> 19

atg	act	agt	att	ttt	gca	gaa	caa	act	gta	gag	gta	gtt	aaa	agc	gct		48
atc	gaa	acc	gca	gat	ggg	gca	tta	gat	ctt	tat	aac	aaa	tac	ctc	gac		96
cag	gtc	atc	ccc	tgg	aag	acc	ttt	gat	gaa	acc	ata	aaa	gag	tta	agc		144
cgt	ttt	aaa	cag	gag	tac	tcg	cag	gaa	gct	tct	gtt	tta	gtt	ggt	gat		192
att	aaa	gtt	ttg	ctt	atg	gac	agc	cag	gac	aag	tat	ttt	gaa	gct	aca		240
caa	act	gtt	tat	gaa	tgg	tgt	ggt	gtc	gtg	acg	caa	tta	ctc	tca	gct		288
tat	att	tta	cta	ttt	gat	gaa	tat	aat	gag	aaa	aaa	gca	tca	gcc	cag		336
aaa	gac	att	ctc	att	agg	ata	tta	gat	gat	ggt	gtc	aag	aaa	ctg	aat		384
gaa	gct	caa	aaa	tct	ctc	ctg	aca	agt	tca	caa	agt	ttc	aac	aac	gct		432
tcc	gga	aaa	ctg	ctg	gca	tta	gat	agc	cag	tta	act	aat	gat	ttt	tcg		480
gaa	aaa	agt	agt	tat	ttc	cag	tca	cag	gtg	gat	aga	att	cgt	aag	gaa		528
gct	tat	gcc	ggt	gct	gca	gcc	ggc	ata	gtc	gcc	ggt	ccg	ttt	gga	tta		576
att	att	tcc	tat	tct	att	gct	gct	ggc	gtg	att	gaa	ggg	aaa	ttg	att		624
cca	gaa	ttt	aat	aac	agg	cta	aaa	aca	gtg	caa	aat	ttc	ttt	act	agc		672
tta	tca	gct	aca	gtg	aaa	caa	gct	aat	aaa	gat	atc	gat	gct	gca	aaa		720
ttt	aaa	tta	gcc	act	gaa	ata	gca	gca	att	ggg	gag	ata	aaa	acg	gaa		768
acc	gaa	aca	acc	aga	ttc	tac	gtt	gat	tat	gat	gat	tta	atg	ctt	tct		816
tta	tta	aaa	gga	gct	gca	aag	aaa	atg	att	aat	acc	tgt	aat	gaa	tac		864
caa	caa	cgt	cat	ggt	aag	aag	acg	ctt	ttc	gag	gtt	cct	gac	gtc	gtc		912
agt	aaa	gaa	acg	aac	caa	aag	cca	tat	aag	gaa	aca	tac	ggc	att	tcc		960
cat	att	aca	cgc	cat	gat	atg	ctg	caa	atc	cct	gaa	cag	caa	aaa	aat		1008
gaa	aaa	tat	caa	gtt	cct	gaa	ttc	gat	tcg	tcc	aca	att	aaa	aat	atc		1056

tct tct gca aaa ggc ctg gac gtt tgg gac agc tgg cca tta caa aac	1104
gct gac ggc act gtc gca aac tat cac ggc tac cac atc gtc ttt gca	1152
tta gcc gga gat cct aaa aat gcg gat gac aca tcg att tac atg ttc	1200
tat caa aaa gtc ggc gaa act tct att gac agc tgg aaa aac gct ggc	1248
cgc gtc ttt aaa gac agc gac aaa ttc gat gca aat gat tct atc cta	1296
aaa gac caa aca caa gaa tgg tca ggt tca gcc aca ttt aca tct gac	1344
gga aaa atc cgt tta ttc tac act gat ttc tcc ggt aaa cat tac ggc	1392
aaa caa aca ctg aca act gca caa gtt aac gta tca gca tca gac agc	1440
tct ttg aac atc aac ggt gta gag gat tat aaa tca atc ttt gac ggt	1488
gac gga aaa acg tat caa aat gta cag cag ttc atc gat gaa ggc aac	1536
tac agc tca ggc gac aac cat acg ctg aga gat cct cac tac gta gaa	1584
gat aaa ggc cac aaa tac tta gta ttt gaa gca aac act gga act gaa	1632
gat ggc tac caa ggc gaa gaa tct tta ttt aac aaa gca tac tat ggc	1680
aaa agc aca tca ttc ttc cgt caa gaa agt caa aaa ctt ctg caa agc	1728
gat aaa aaa cgc acg gct gag tta gca aac ggc gct ctc ggt atg att	1776
gag cta aac gat gat tac aca ctg aaa aaa gtg atg aaa ccg ctg att	1824
gca tct aac aca gta aca gat gaa att gaa cgc gcg aac gtc ttt aaa	1872
atg aac ggc aaa tgg tac ctg ttc act gac tcc cgc gga tca aaa atg	1920
acg att gac ggc att acg tct aac gat att tac atg ctt ggt tat gtt	1968
tct aat tct tta act ggc cca tac aag ccg ctg aac aaa act ggc ctt	2016
gtg tta aaa atg gat ctt gat cct aac gat gta acc ttt act tac tca	2064
cac ttc gct gta cct caa gcg aaa gga aac aat gtc gtg att aca agc	2112
tat atg aca aac aga gga ttc tac gca gac aaa caa tca acg ttt gcg	2160
cca agc ttc ctg ctg aac atc aaa ggc aag aaa aca tct gtt gtc aaa	2208
gac agc atc ctt gaa caa gga caa tta aca gtt aac aaa tag tga	2253